

WHAT IS CLAIMED IS:

1. A magnetic recording medium comprising:

a non-magnetic substrate;

5 a soft magnetic layer formed on the non-magnetic substrate, the soft magnetic layer including a plurality of projected parts arranged regularly on a surface thereof and recessed parts surrounding each of the projected parts;

a ferromagnetic layer formed on the soft magnetic layer, the ferromagnetic layer including projected parts and recessed parts reflecting the projected parts and the recessed parts of the soft magnetic layer; and

10 recording areas having perpendicular magnetic anisotropy and ferromagnetism, the recording areas being formed of the projected parts of the ferromagnetic layer and being separated magnetically from their surroundings.

2. The magnetic recording medium according to claim 1, wherein the non-  
15 magnetic substrate includes a plurality of projected parts arranged regularly on a surface thereof and recessed parts surrounding each of the projected parts, and the projected parts and recessed parts of the soft magnetic layer reflect the recessed parts and the projected parts of the non-magnetic substrate.

20 3. The magnetic recording medium according to claim 1, wherein the non-magnetic substrate has a flat surface, and the soft magnetic layer has the projected parts and the recessed parts on the surface thereof.

4. The magnetic recording medium according to claim 3, wherein the soft  
25 magnetic layer comprises a soft magnetic film having a flat surface; and

soft magnetic fine particles arranged regularly separately from each other on the soft magnetic film.

5        5. The magnetic recording medium according to claim 1, wherein the soft magnetic layer has such a thickness that a magnetic orientation thereof is stably uniform in an in-plane direction during writing and reading.

10       6. The magnetic recording medium according to claim 1, wherein a thickness L1 of the soft magnetic layer is at least twice a height L2 of the projected parts of the soft magnetic layer.

15       7. The magnetic recording medium according to claim 1, wherein a thickness of the ferromagnetic layer is set to be from  $1/2$  to  $1/4$  of a height L2 of the projected parts of the soft magnetic layer.

8. The magnetic recording medium according to claim 1, wherein the ferromagnetic layer is made of an artificial lattice layer.

20       9. A magnetic recording medium comprising:  
a non-magnetic substrate including a plurality of projected parts arranged regularly on a surface thereof and recessed parts surrounding each projected part;  
a magnetic layer formed on the non-magnetic substrate, the magnetic layer including a plurality of projected parts and recessed parts reflecting the projected parts and the recessed parts of the non-magnetic substrate;  
25       recording areas having perpendicular magnetic anisotropy and ferromagnetism, the recording areas being formed of the projected parts of the magnetic layer, and being

separated magnetically from their surroundings; and

non-recording areas having soft magnetism, the non-recording areas being formed of the magnetic layer excepting the recording areas.

5           10. The magnetic recording medium according to claim 9, wherein the magnetic layer is made of an artificial lattice layer.

                  11. A method for manufacture of a magnetic recording medium comprising:  
                  forming a soft magnetic layer including a plurality of projected parts arranged  
10   regularly on a surface thereof and recessed parts surrounding each of the projected parts; and  
                  forming a ferromagnetic layer having perpendicular magnetic anisotropy on the soft magnetic layer.

15           12. The manufacture method according to claim 11, wherein the formation of the soft magnetic layer comprises:  
                  forming a non-magnetic substrate including a plurality of projected parts arranged regularly on a surface thereof and recessed parts surrounding each of the projected part; and  
20           depositing a soft magnetic layer on the non-magnetic substrate.

                  13. The manufacture method according to claim 12, wherein the projection parts and the recessed parts of the non-magnetic substrate are processed by using an injection molding method.

25           14. The manufacture method according to claim 13, wherein a mold

used for the injection molding method is made by forming a regular dot pattern on a material of the mold by use of a self-organizing function of block co-polymer, and etching a surface of the material using the dot pattern as a mask pattern.

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15. The manufacture method according to claim 11, wherein the formation of the soft magnetic layer comprises:

preparing a non-magnetic substrate having a flat surface;

depositing a soft magnetic layer having a flat surface on the non-magnetic

10 substrate; and

forming a plurality of projected parts arranged regularly and recessed parts

surrounding each projected part on the flat surface of the soft magnetic layer by using a press molding method.

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16. The manufacture method according to claim 15, wherein a mold

used for the press molding method is made by forming a regular dot pattern on a material of the mold by use of a self-organizing function of block co-polymer, and etching a surface of the material using the dot pattern as a mask pattern.

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17. The manufacture method according to claim 11, wherein the formation of the soft magnetic layer comprises:

depositing a soft magnetic film having a flat surface on a non-magnetic

substrate; and

arranging regularly soft magnetic fine particles including a composition

25 common with the soft magnetic film separated from each other on the soft magnetic film.

18. The manufacture method according to claim 17, wherein the arrangement of the soft magnetic fine particles is performed by use of a self-organizing function thereof.

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19. A method for manufacture of a magnetic recording medium comprising:  
forming a non-magnetic substrate including a plurality of projected parts arranged regularly on a surface thereof and recessed parts surrounding each projected part; and

10 forming an artificial lattice layer made of a ferromagnetic material having perpendicular magnetic anisotropy on the non-magnetic substrate.

20. The manufacture method according to claim 19, wherein the projection parts and the recessed parts of the non-magnetic substrate are processed by using an  
15 injection molding method.

21. The manufacture method according to claim 20, wherein a mold used for the injection molding method is made by forming a regular dot pattern on a material of the mold by use of a self-organizing function of block  
20 co-polymer, and etching a surface of the material using the dot pattern as a mask pattern.